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## **CLAIMS**

- 1. (original) A method for manufacturing a semiconductor device, comprising steps of:
- forming source and drain extension regions in an upper surface of a SiGe-based substrate, the source and drain extension regions containing an N type impurity; and

reducing vacancy concentration in the source and drain extension regions to decrease diffusion of the N type impurity contained in the first source and drain regions.

- 2. (original) The method of claim 1, wherein the step of reducing vacancy concentration comprises a step of providing an interstitial element or a vacancy-trapping element in the source and drain extension regions.
- 3. (original) The method of claim 2, wherein the interstitial element is Si or O, and the vacancytrapping element is F, N, Xe, Ar, He, Kr or a noble gas element.
- 4. (original) The method of claim 2, wherein the step of providing the interstitial element or vacancy-trapping element comprises a step of ion-implanting the interstitial element or the vacancy-trapping element onto the SiGe-based substrate.
- 5. (original) The method of claim 4, wherein the step of ion-implanting the interstitial element or the vacancy trapping element comprises a step of ion-implanting the interstitial element or the vacancy trapping element at an implantation concentration of approximately 1 x 1014 atoms/cm2 to 1 x 1016 atoms/cm2 and at an implantation energy of approximately 0.3 KeV to 100 KeV.
- 6. (original) The method of claim 5, wherein the SiGe substrate comprises a Si cap layer on a SiGe film on a silicon substrate.

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- 7. (original) The method of claim 6, wherein a concentration peak of the interstitial element or the vacancy-trapping element and a concentration peak of the N type impurity in the source and drain extension regions are formed at substantially the same depth from an upper surface of the Si cap layer.
- 8. (original) The method of claim 7, wherein the concentration peak of the interstitial element or the vacancy-trapping element is formed at a depth of approximately 10 Å to 20000 Å from the upper surface of the Si cap layer.
- 9. (original) The method of claim 4, further comprising a step of annealing.
- 10. (original) The method of claim 9, wherein the step of annealing is performed at a temperature of approximately 700° C to 1200 ° C for approximately 1 second to 3 minutes.
- 11. (original) The method of claim 1, further comprising a step of forming a gate electrode on the upper surface of the SiGe-based substrate with a gate oxide film therebetween.
- 12. (original) The method of claim 1, further comprising a step of forming source and drain regions in the upper surface of the SiGe-based substrate, the source and drain regions containing the N type impurity and overlapping the source and drain extension regions.
- 13. (original) The method of claim 12, further comprising a step of providing an interstitial element or a vacancy-trapping element in the source and drain regions.
- 14. (original) The method of claim 13, wherein the interstitial element is Si or O, and the vacancy-trapping element is F, N, Xe, Ar, He, Kr or a noble gas element.

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15. (original) The method of claim 14, wherein the step of reducing the vacancy concentration in the source and drain regions comprises a step of ion-implanting the interstitial element or the vacancy-trapping element.

16. (original) A method for reducing diffusion of an N type impurity in a SiGe-based substrate, the method comprising steps of:

forming source and drain extension regions in an upper surface of the SiGe-based substrate; and

ion implanting an interstitial element or a vacancy-trapping element into the source and drain extension regions to reduce vacancy concentration in the source and drain extension regions.

- 17. (original) The method of claim 19, wherein the interstitial element is Si or O, and the vacancy-trapping element is F, N, Xe, Ar, He, Kr or a noble gas element.
- 18. (original) The method of claim 16, further comprising a step of forming source and drain regions.

19-20. (Cancelled)